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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,994	03/05/2002	Noriyuki Yamamoto	900-420	4459

23117 7590 08/17/2005

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EXAMINER	
CREPEAU, JONATHAN	
ART UNIT	**PAPER NUMBER**
1746	

DATE MAILED: 08/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,994	YAMAMOTO ET AL.	
	Examiner	Art Unit	
	Jonathan S. Crepeau	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9,12,28,30,32 and 34* is/are allowed.

6)☒ Claim(s) *1-4,6-8,10,11,13-17,19-24,26,27,29,31 and 33* is/are rejected.

7)☒ Claim(s) *5,18 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1-34. Applicant's submission of the priority document translation is sufficient to obviate the rejections presented in the previous Office action. However, claims 1-4, 6-8, 10, 11, 13-17, 19-24, 26-29, 31, and 33 are newly rejected under 35 USC 103 herein. Claims 5, 9, 12, 18, 25, 28, 30, 32, and 34 contain allowable subject matter. This action is non-final.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-4, 6-8, 10, 11, 13-17, 19, 20, 27, 29, 31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al (*Applied Biochem. and Bioeng.*, 1983).

The abstract of the reference teaches fuel cell employing immobilized *Clostridium butyricum* for hydrogen production. However, the reference does not expressly teach that the fuel cell comprises a polymer electrolyte or a housing, or that the bacteria is immobilized as a layer adjacent the anode, or as a filter upstream of the fuel cell.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to incorporate the fuel cell of Suzuki into a housing. Such a housing would be useful to prevent mixing of reactants and to extend the life of the components of the cell. As such, this limitation is not considered to distinguish over the disclosure of Suzuki. Regarding the limitation that the fuel cell is a polymer electrolyte fuel cell, it would also be obvious to use such an electrolyte in the fuel cell of Suzuki. These fuel cells are known to operate at lower temperatures but still have a relatively high efficiency. As such, it would be obvious to use such an electrolyte in the fuel cells of Suzuki.

Regarding the limitations directed to a "layer" of biochemical catalyst and the placement of such a layer adjacent the anode or as a filter upstream of the fuel cell, these configurations would be obvious based on the disclosure of Suzuki. As noted above, the reference teaches that the cells are "immobilized," and as such, the artisan would be sufficiently skilled to place the resulting immobilized layer at an appropriate position within the system, i.e., adjacent the anode or upstream of the fuel cell in the fuel supply stream. As such, these limitations are also not considered to distinguish over the reference.

Regarding the subject matter of claims 6 and 7, among others, the claimed fuel species are not considered to distinguish over the reference. In particular, the recitation of aqueous solution would be rendered obvious because it is known to feed wastewater to the bacteria disclosed by Suzuki. Further, materials such as polysaccharides and carboxylic acids would likely be present in such wastewater and therefore would also be rendered obvious.

Additionally, it is also known to feed glucose to the bacteria disclosed by Suzuki. As such, the subject matter of claims 6 and 7 would be rendered obvious to the skilled artisan.

4. Claims 21-24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palmore et al. (*J. Electroanal. Chem.*, 1998).

The reference teaches polymer electrolyte fuel cell employing enzymes for decomposing methanol, formaldehyde, and formic acid (see section 2.5; Scheme 2). The fuel cell comprises a housing (see Scheme 3). Further, the reference teaches on page 156 that enzymatic biofuel cells "where enzymes, both in solution or immobilized, are used as the catalyst" are known. However, the reference does not expressly that the bacteria is immobilized as a layer adjacent the anode, or as a filter upstream of the fuel cell, as recited in claims 21 and 23.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the claimed configurations would be obvious based on the disclosure of Palmore. As noted above, the reference teaches that enzymatic biofuel cells containing immobilized enzymes are known. As such, a person of skill in the art would infer that immobilized enzyme systems are functionally equivalent to enzyme solution systems. Therefore, the artisan would be sufficiently skilled to place an immobilized layer at an appropriate position within the system, i.e., adjacent the anode or upstream of the fuel cell in the fuel supply stream. As such, these limitations are also not considered to distinguish over the reference.

Allowable Subject Matter

5. Claims 9, 12, 28, 30, 32, and 34 are allowed.

6. Claims 5, 18, and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:

The instant claims each recite that the catalyst comprises a combination of *Clostridium butyricum* and hydrogen formate lyase. The abstract of Suzuki does not teach or suggest using hydrogen formate lyase in combination with the *Clostridium butyricum*.

Conclusion

8. A complete copy of the Suzuki reference applied above has been ordered. Should applicants wish to review the reference prior to filing the next response, they are invited to contact the Examiner.

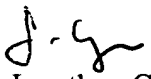
9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Suzuki et al. (Biotch. and Bioeng. Symp. 1979, abstract), discloses an ion-exchange membrane fuel cell and packed bed reactor containing immobilized *Clostridium butyricum*;

Karube et al. (Biotech. and Bioeng. 1977, abstract), discloses immobilized *Clostridium butyricum* on one side of a fuel cell anode, that is fed with glucose.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr, can be reached at (571) 272-1414. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Crepeau
Primary Examiner
Art Unit 1746
August 12, 2005